AYK REGION
HERRING REPORT # 1

NORTON SOUND HERRING CATCH SAMPLING PROGRAM
1964

(From AYK Area 1964 Annual Management Report)

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INTRODUCTION

A catch sampling program was conducted on commercially harvested herring stocks near Unalakleet. The sampling was carried out by the processors under procedures specified by Department of Fish and Game Biologists.

Objectives of this project were to provide age, lengths, weights, and sex compositions of the harvested herring stocks. Very little is known of the Norton Sound herring; the 1964 commercial fishery presented the opportunity to collect this basic information.

METHODS

Scale samples were taken from the area immediately behind the pectoral fin of each fish. Fewer regenerated or damaged scales are found in this area. Length measurements were taken from the tip of the snout to the hypural plate and recorded in centimeters. Weights of fresh caught fish were taken and recorded in grams. Sex was determined by examination of the gonads. Scales were placed in envelopes to be mounted on slides and read at a later date. Pertinent information was recorded on scale envelopes.

RESULTS

A total of 350 spawning herring was sampled from the commercial catch to determine age composition, length, weight, sex ratio, and effectiveness of fishing methods. Although these initial samples were very limited, some general statements of this herring population can be made. Also some interesting comparisons of this Norton Sound population to other Pacific coast stocks can be broadly stated in regard to age composition, length, and weight.

Age analysis of 339 readable slide-mounted scales showed this Norton Sound herring population was composed of the following age groups: four-year-old fish (6.49 percent), five-year-olds (14.45 percent), six-year-olds (32.45 percent), seven-year-olds (30.38 percent), eight-year-olds (12.98 percent), and nine to twelve-year-olds (3.24 percent) (see Table 49). The average age for all herring was 6.43 years. The high proportion of the older age groups and the low percentage of younger age groups is characteristic of an unexploited population. Also a spawning population, such as these Norton Sound herring, could be expected to be composed of fewer younger fish than a non-spawning population. Whether this age pattern is characteristic of all Norton Sound

TABLE 49

AGE COMPOSITION, AVERAGE LENGTHS AND WEIGHTS OF PACIFIC HERRING
NORTON SOUND, 1964

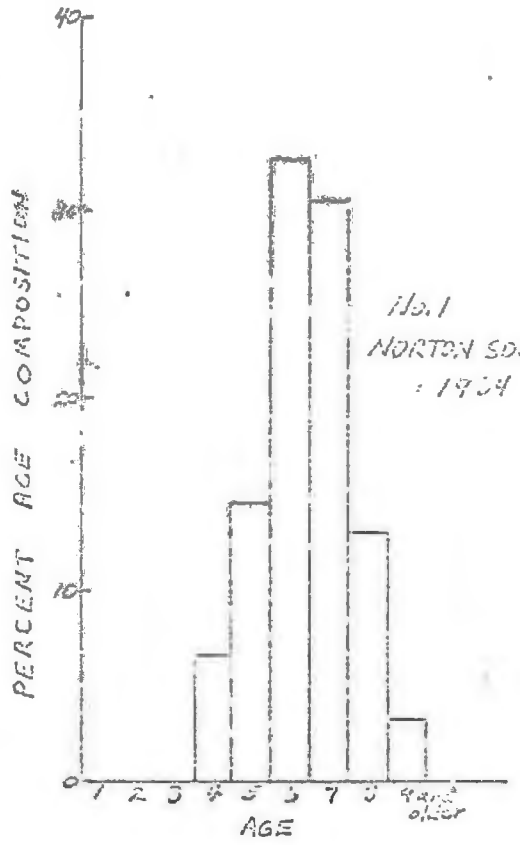
Age	Number (Per Cent Composition)			Average Length (mm)			Average Weight (g)		
	Males	Females	Combined	Males	Females	Combined	Males	Females	Combined
4	9 (4.61)	13 (9.03)	22 (6.49)	208.9	207.3	208.0	117.9	112.5	114.7
5	29 (14.87)	20 (13.89)	49 (14.45)	225.0	229.0	226.6	147.2	155.1	150.4
6	75 (38.46)	35 (24.30)	110 (32.45)	229.6	233.0	230.7	156.0	164.8	158.8
7	50 (25.64)	53 (36.81)	103 (30.38)	235.0	236.5	235.8	172.3	177.9	175.2
8	24 (12.31)	20 (13.89)	44 (12.98)	245.6	242.3	244.1	203.4	186.2	195.6
9	2 (1.03)	-	2 (0.59)	250.0	-	250.0	216.0	-	216.0
10	3 (1.54)	1 (0.69)	4 (1.18)	235.0	270.0	243.8	144.0	298.0	182.5
11	2 (1.03)	2 (1.39)	4 (1.18)	257.5	262.5	260.0	230.0	244.5	237.3
12	1 (0.51)	-	1 (0.29)	275.0	-	275.0	283.0	-	283.0
	195 (100.00)	144 (100.00)	339 (100.00)	232.1	233.4	232.7	164.8	168.6	166.4

Average Age: Males - 6.44 Years
Females - 6.42 Years
Combined - 6.43 Years

herring or only of this particular population would have to be determined by studying other local stocks.

In unexploited herring stocks elsewhere, older age groups compose a higher percentage when compared to exploited populations. For example, graphs number 4 and number 5 of Figure 4 illustrate the age composition differences between exploited and unexploited British Columbia herring populations. In an exploited population, the percentage of older age fish are quickly reduced and the fishery is dependent primarily on the younger age groups, i.e. the newly recruited fish. This is clearly demonstrated by the high proportion of two, three, and four-year-old fish and the reduced numbers of older age groups in the exploited British Columbia population (graph number 4). Conversely, the unexploited British Columbia population (graph number 5) is composed of a lower percentage of two, three, and four-year-old fish and a higher percentage of older age fish.

Along the Pacific Coast, there appears to be a north-south trend in the average age of herring, i.e. northern populations would be older. This tendency is demonstrated to some extent in Figure 4. These Norton Sound herring, the northern-most stock, are mainly six and seven-year-old fish. Kodiak and Southeastern Alaska populations (exploited) are composed of a higher proportion of older age groups than British Columbia herring (graph number 4). This north-south age trend varies, of course, with natural mortality and year-class strength. The trend appears more evident when comparing the two unexploited populations, Norton Sound and British Columbia (graph number 5), which represent the extreme geographic points of the north-south range. These Norton Sound herring are composed of a higher proportion of older fish than the unexploited British Columbia stock.



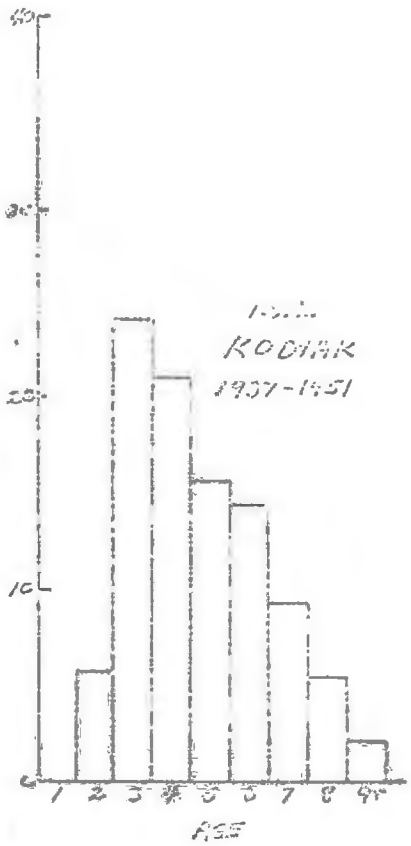
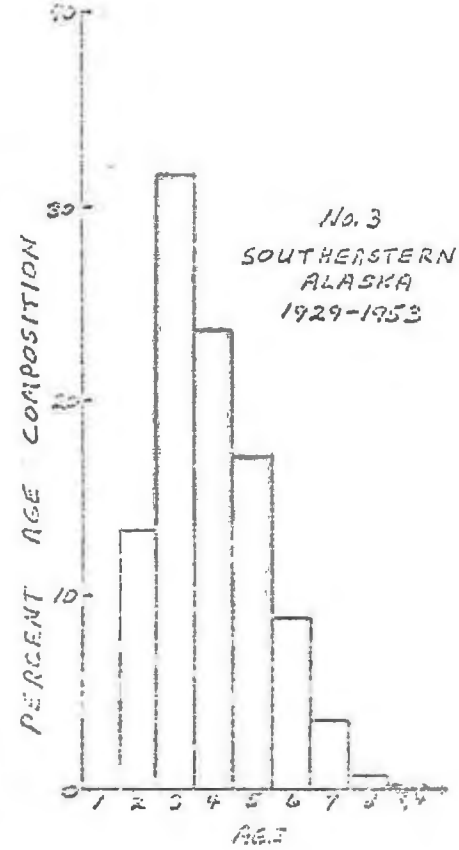
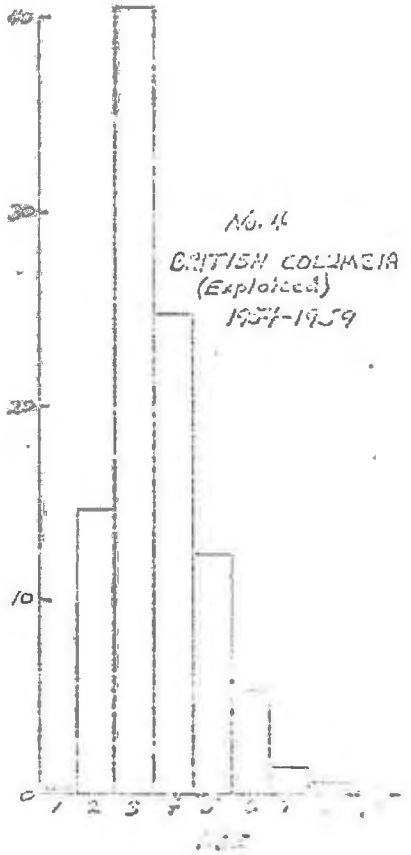
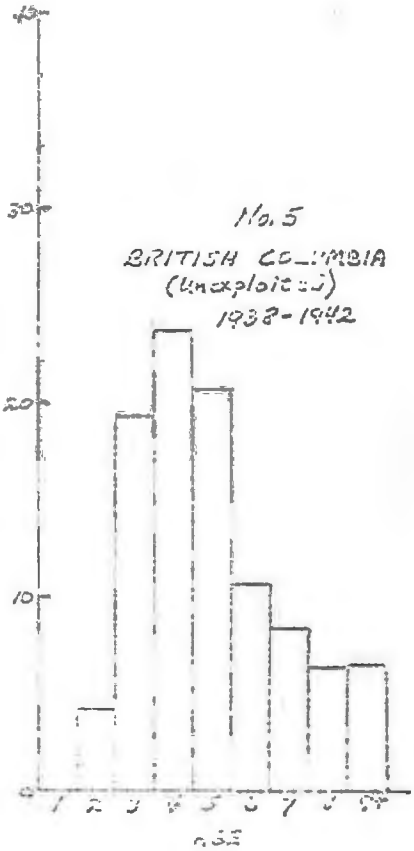


FIGURE 4

PERCENTAGE AGE COMPOSITION OF VARIOUS PACIFIC HERRING POPULATIONS







When compared to the North American populations, Norton Sound herring were found to be larger. Weights of Norton Sound herring range from 99 grams to 305 grams, while the lengths range from 195 mm to 275 mm. The average weight and length of these herring are 232.7 mm and 166.4 grams. Average weights and lengths for each age class of British Columbia and Southeastern Alaska herring, are presented for comparison with Norton Sound fish in Table 48.

Each sampled herring was examined for determination of sex. There were 144 females and 195 males or a female to male ratio of 1.00:1.35 in the sample. Since these samples were limited, it is not possible to state conclusively that the above sex ratio was representative of the entire population. The majority of other herring investigations are of post-spawning fish; therefore, the sex ratio of this Norton Sound sample could not be compared to other studies. There appears to be no significant difference in average age between sexes: Males 6.44 years) and females (6.42 years). Also variations in lengths and weights were negligible between sexes: Males (232.1 mm, 164.8 grams) and females (233.4 mm, 168.6 grams).

In the experimental commercial fishery, two types of fishing methods were employed: beach seine and gill net. It would be expected that the gill net selects a certain size range and age classes of herring. A beach seine, on the other hand, would be non-selective, i.e. all sizes and age classes would be representatively sampled. On June 19, both fishing methods were used and therefore, a comparison might be obtained. However, no definite statement regarding the selectivity of the gill net could be made because the sample size was very limited. Analysis of both catches showed no significant differences in average age, length, and weight: beach seine (5.71 years, 229.7 mm, and 153.1 grams) and gill net (5.81 years, 223.5 mm, and 154.8 grams).

TABLE 50

AVERAGE LENGTHS AND WEIGHTS OF VARIOUS
PACIFIC HERRING POPULATIONS

Age	British Columbia (1958-1959)		Norton Sound (1964)		Southeastern Alaska (1962)	
	Length (mm)	Weight (g)	Length (mm)	Weight (g)	Length (mm)	Weight (g)
1	118.2	18	-	-	-	-
2	152.6	42	-	-	167.6	37
3	179.1	75	-	-	188.3	74
4	192.2	98	208.0	115	195.6	101
5	203.9	118	226.6	150	203.2	120
6	208.7	137	230.7	159	209.0	137
7	217.3	152	235.8	175	215.3	149
8	217.8	162	244.1	195	215.7	161
9	222.7	172	250.0	216	221.5	-
10	222.2	178	243.8	183	-	-
11	239.0	-	260.0	237	-	-
12	-	-	275.0	283	-	-